SYNOPSIS OF HOPLODICTYA CRESSON WITH ONE NEW SPECIES (DIPTERA:SCIOMYZIDAE)[1]

T. W. Fisher and R. E. Orth[2]

Introduction.—Since 1962 when California Experiment Station Project No. 2037, "Biological Control of Non-marine Mollusks," was initiated, we have been studying the genus *Hoplodictya* and early recognized, as did Steyskal (1965b), that "*H. spinicornis*" included a complex of species. Over 400 specimens have been collected in western North America, and material from 17 collections, most of which covered regions outside our normal area of interest, has been studied.

Having examined the type specimen or type series of *H. spinicornis* (Loew) and its synonym *H. acuticornis* (v. d. Wulp), respectively, we are now able to present this revision which is based primarily on highly consistent differences in male terminalia, reasonably consistent differences in female terminalia, and geographical distribution. The configurations of the posterior surstyli and the ventral process of the hypandria are the principal diagnostic characters. They show negligible variation throughout the ranges of the three species we now recognize in the *H. spinicornis* complex and are, therefore, considered reliable as diagnostic criteria.

The distribution map (Fig. 15) includes only localities for material that we have seen and identified by examination of male and/or female terminalia.

Hoplodictya setosa (Coquillett) and *H. kincaidi* (Johnson) are narrowly restricted in distribution, are morphologically strikingly dis-

[1]Accepted for publication: December 24, 1971 [3.0163].

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tinct from each other in both sexes and from the *H. spinicornis* complex; they will receive only cursory treatment.

Hoplodictya

Hoplodictya Cresson (Cresson, 1920) (type-species, *Tetanocera setosa* Coquillett (original description, Coquillett, 1901)) can be distinguished from other nearctic genera of tetanocerine Sciomyzidae by the following gross characteristics: vallar (subalar) bristles absent, well-developed ocellar and post-ocellar bristles, one strong pre-apical bristle on hind tibia, second antennal segment at least one-half length of third segment, arista with black hairs, wing heavily marked with blackish spots and reticulations, body brownish with black to brownish spots and elongate markings, mesopleuron with bristles, two fronto-orbital bristles (first bristle usually weak and occasionally absent in *H. setosa*), face without central black spot. The last mentioned feature readily separates the genus *Hoplodictya* from *Dictya* Meigen, the genus it most closely resembles. Other differences between these two genera are (1) the eyes in the *H. spinicornis* complex are longer vertically and more inverted pear-shaped (Figure 16) than in the genus *Dictya*, [however, those in *H. setosa* and *H. kincaidi* much as in the genus *Dictya*], and (2) a row of two or three spines dorsally at distal end of second antennal segment heavy in the genus *Hoplodictya* but less so in the genus *Dictya.*

Hoplodictya australis Fisher and Orth, NEW SPECIES

(Figures 1, 2, 9)

The general shape of the posterior surstylus is almost square [except for accessory lobe and the dorsal tip]; the accessory lobe is nearly straight and directed anteriorly; the dorsal tip is somewhat pointed and directed posteriorly and can be seen without dissection. Four or less (occasionally none) fine hairs on dorsum of protandrial tergum. The ventral process of the hypandrium is slender, curved slightly forward and tapers to a blunt point. In the female, both spermathecae nearly "fit" inside sternum VIII; posterior margin of sternum VII rounded at corners; dorsum of tenth somite without fine bristles. Wing length of 28 females, 2.8 mm to 4.1 mm (average, 3.60 mm); of 40

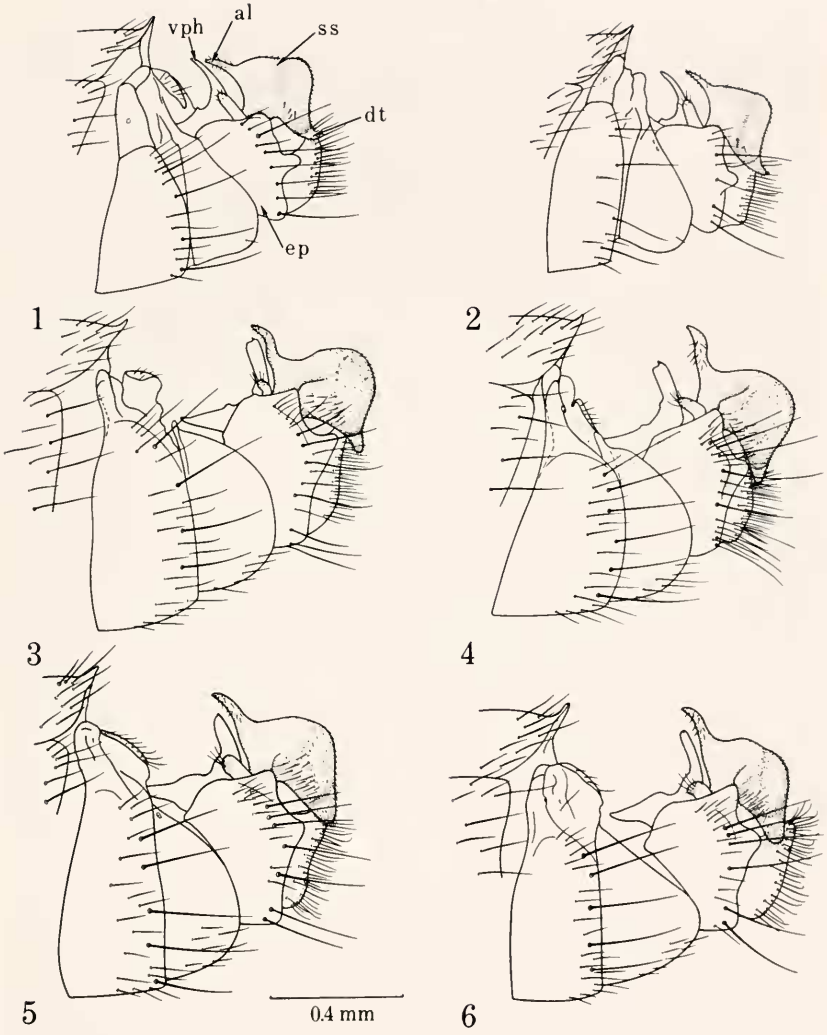


Fig. 1-6. Male postabdomen, dextral view, inverted. Fig. 1-2. *Hoplodictya australis* Fisher and Orth, n. sp.: Fig. 1 Paratype, male. Cuba, Havana (J. M. Aldrich) (Baker Collection, USNM); *al*, accessory lobe; *dt*, dorsal tip; *ep*, epandrium; *ss* surstylus; *vph*, ventral process of hypandrium. Fig. 2 Paratype, U.S.A.; Florida, Paradise Key, 1 March 1919 (Schwarz and Barber '19) (USNM). Fig. 3-4. *Hoplodictya spinicornis* (Loew): Fig. 3 Homeotype. Mexico; Oaxaca, 6 miles north of Oaxaca, 10 August 1958 (Neff and Matthews) (USNM). Fig. 4 Homeotype. U.S.A.; Florida, St. Augustine, 12 April 1919 (C. W. Johnson collection) (MCZ). Fig. 5-6. *Hoplodictya acuticornis* (van der Wulp): Fig. 5 Homeotype. U.S.A.; Utah, Box Elder Co., 8 September 1964 (K. J. Capelle) (USNM). Fig. 6 Homeotype. U.S.A.; California, Orange Co., San Juan Creek, 24 August 1965 (R. E. Orth) (UCR).

males, 2.5 mm to 3.5 mm (average, 3.05 mm). Distribution (Figure 15): Texas, Louisiana, Mississippi, Georgia, Florida, Cuba, Bahama Islands.

HOLOTYPE, male, wing length 3.1 mm. Florida; *Monroe Co.*; Everglades National Park, Flamingo, 6 December 1970 (P. H. Arnaud, Jr.). (USNM[3], Type No. 72057. ALLOTYPE, wing length 3.4 mm. Florida; *Dade Co.*; Royal Palm Park, 29 January 1933 (A. L. Melander) (USNM).

Additional material was seen from the following localities: FLORIDA: *St. Johns Co.*: 0.4 miles n. Marineland, Hwy. A1A, 31 March 1970 (K. R. Valley) (CU); St. Augustine, 14 April 1919 (C. W. Johnson) (MCZ). *Dade Co.*: Paradise Key, 23 February 1919 (Schwarz and Barber) (USNM); Hialeah, 19 February 1967 (C. Stegmaier) (USNM); [*Hendry Co.*][4]: La Belle, 19 July 1948 (H. W. Crowder) (UK). [*Jackson Co.*]: Alford, 9 July 1939 (D. E. Hardy) (UK). [*Leon Co.*]: Tallahassee, 14 July 1934 (M. E. Griffith) (UK). *Manatee Co.*: Oneco, 25 March 1954 (G. E. Ball) (CU). [*Osceola Co.*]: Kissimmee, 1 February 1932 (A. L. Melander) (USNM). GEORGIA: [*Charlton Co.*]: Okefenoke Swamp, 29 July 1939 (R. H. Beamer) (CU). LOUISIANA: [*Evangeline Co.*]: Basile, 5 May 1958 (Evans and Flint) (CU). *Natchitoches Co.*: (no locality) 16 August 1938 (R. H. Beamer) (CU). MISSISSIPPI: *Hancock Co.*: 4 miles w. Bay St. Louis, US Hwy. 90, 27 March 1971 (K. R. Valley) (CU). [*Jackson Co.*]: Ocean Springs, 5 March 1947 (L. D. Beamer) (UK). TEXAS: [*Dallas Co.*]: Dallas, 18 June 1906 (W. D. Pierce) (USNM). *Madison Co.*: Normangee, 12 April 1967 (J. C. Schaffner) (TAM). *Gonzales Co.*: Palmetto State Park, 3 April 1969 (V. V. Board) (TAM); 6.5 miles w. New Waverly, San Jacinto River, 22 April 1969 (Burke and Board) (TAM). CUBA: Havana, (no date) (Baker) (USNM). BAHAMA ISLANDS: Andros Town, 7-13 March 1966 (O. L. Cartwright) (USNM).

Deposition of Material.—Holotype, allotype to USNM: Paratypes to ANSP, CU, MCZ, TAM, UCR, UK, USNM.

Hoplodictya spinicornis (Loew), redescribed

(Figures 3, 4, 11, 14)

Original description, Loew (1866).

The female specimen from the Museum of Comparative Zoology that we presume to be Loew's type bears the following data: on a red label "Type, 13224," on a blue label "56/226," on a white label "*Tetanocera spinicornis.*" No locality is given, but we assume it is the specimen from Cuba cited by Loew (1866; 1872, republished). The speci-

[3]Abbreviations of museums may be found under Acknowledgments.

[4]Brackets [] indicate our county designation.

men is in rather poor condition, but it exhibits the following characteristics which permit placement with mainland females that we assign to this species: (1) each spermatheca is approximately the size of sternum VIII; (2) the posterior margin of sternum VII is angulate at the corners; (3) the wing length is 4.2 mm; (4) there are three fine bristles on the dorsum of the tenth somite.

The generalized configuration of the posterior surstylus is a smoothly rounded bulge, or helmet shape. The accessory lobe is slightly recurved and the dorsal tip is acutely rounded with at most a slight posterior direction. The ventral process of the hypandrium (from *in situ*, lateral aspect) is nearly truncate and broader than the accessory lobe of the surstylus. Ten or more fine bristles on dorsum of protandrial tergite. Wing lengths of 45 F, 4.2 mm to 5.2 mm (average, 4.6 mm); 119 M, 3.6 mm to 4.5 mm (average, 4.1 mm). Females possess 2, rarely 3, fine bristles on dorsum of tenth somite. To clarify our concept of *H. spinicornis* we designate a Neallotype male from Texas and a number of Homeotypes of both sexes from several localities throughout the range of the species. Distribution (Figure 15): Guatemala, Mexico, Texas, Louisiana, Mississippi, Georgia, Florida, Delaware, Maryland, District of Columbia, New Jersey, Jamaica, Cuba.

HOLOTYPE, female, wing length 4.2 mm. Cuba. NEALLOTYPE, wing length 4.1 mm. Texas; [*Cameron Co.*]: Harlingen, 9 March 1945 (D. E. Hardy) (USNM).

Additional material was seen from the following localities: DELAWARE: Woodland Beach, 8 September 1968 (K. R. Valley) (CU). DISTRICT OF COLUMBIA: Washington (no date) (N. Banks) (MCZ). FLORIDA: *Alachua Co.*: Biven's Arm of Paynes Prairie, 25 March 1968 (K. R. Valley) (CU); Chitty Ranch, s. Gainesville, 25 March 1968 (C. O. Berg) (CU); St. Augustine, 12 April 1919 (C. W. Johnson) (MCZ). *Dade Co.*: Hialeah, 12 January 1967 (C. Stegmaier) (USNM), GEORGIA: *McIntosh Co.*: Rt. 17. 0.2 miles s. Butler River, 24 March 1968 (C. O. Berg & K. R. Valley) (CU). LOUISIANA: U. S. (Rte.) 61 & 51, 20 miles west to 50 miles nw. New Orleans, 2, 3 December 1965 (Berg & Knutson) (CU); *St. Charles Co.*: West side Bonnet Carre spillway, s. (Rte.) 61, 27 March 1971 (K. R. Valley) (CU); Basile, 5 May 1958 (Evans & Flint) (CU); *St. Tammany Co.*: U. S. Hwy. 90, 6.5 miles w. Rigolets River, salt marsh, 27 March 1971 (K. R. Valley) (CU); [*Cameron Co.*]: Creole, 7 June 1957 (Price, Beamers, Wood) (UK). MARYLAND: [Calvert Co.]: Chesapeake Beach, 18 June 1914 (L. O. Jackson) (USNM). MISSISSIPPI: *Jackson Co.*: U. S. Hwy. 90, 0.7 miles w. Pascagoula River salt marsh, 28 March 1971 (K. R. Valley) (CU); *Hancock Co.*: U. S. Hwy. 90, 4 miles w. Bay St. Louis, 27 March

1971 (K. R. Valley) (CU). NEW JERSEY: [Atlantic Co.]: Atlantic City, 2 September 1935 (Blanton & Borders) (CU); [Monmouth Co.]: Avon, 27 September 1908 (no Coll.) (ANSP). TEXAS: [*Brazoria Co.*]: Alvin, 10 May 1967 (A. D. Bratt) (CU); Pearland, 11 May 1963 (A. D. Bratt) (CU); [*Chambers Co.*]: Gilchrist, 6 May 1958 (Evans & Flint) (CU); [*Cameron Co.*]: Laguna Madre, 25 miles se. Harlingen, 17 February 1945 (D. E. Hardy) (USNM); [*Galveston Co.*]: Galveston, 17 March 1908 (E. S. Tucker) (USNM); [*Hidalgo Co.*]: San Juan, 14 October 1936 (B. Stugard) (UK); [*Bexar Co.*]: San Antonio, 3 April 1942 (A. L. Melander) (USNM); *Fayette Co.*: 10 miles ne. La Grange, 13 April 1970 (V. V. Board) (TAM); *Hidalgo Co.*: Santa Ana Wildlife Ref., 17 June 1969 (Board & Hafernik) (TAM); *Gonzalez Co.*: Palmetto State Park, 3 April 1969 (V. V. Board) (TAM); *Walker Co.*: 8 miles w. New Waverly, 3 May 1970 (V. V. Board) (TAM). GUATEMALA: *Totonicapan*: San Cristobal T. 13 June 1966 (Flint and Ortiz) (USNM); *Coban*: Alta Vera Paz, 15 May 1926 (J. M. Aldrich) (USNM); 18 km se. Guatemala City, 22 July 1958 (Neff & Matthews) (CU). JAMAICA: Portland (no date) (C. W. Johnson) (MCZ); Pt. Antonio, April, 1891 (No Coll.) (ANSP). MEXICO: *Michoacan*: Patzcuaro Lake on road to Erongaricuaro, 1200 m., 15 August 1969 (K. R. Valley) (CU); *Oaxaca*: 6 miles n. Oaxaca, 10 August 1958 (Neff & Matthews) (CU); *Lomatan*: 3 miles sw. Chiapis, 5 March 1953 (R. F. Smith) (UCR); *Puebla*: 2 miles nw. Tehuacan, 25 April 1953 (R. C. Bechtel & E. I. Schlinger) (UCR); 7 miles n. Matamoros Izucar, 19 August 1962 (N. Marston) (UCR).

Deposition of Material—Holotype, female to MCZ; Neallotype, to USNM. Homeotypes to CU, MCZ, TAM, UCR, UK, USNM.

Hoplodictya acuticornis (van der Wulp), resurrected, redescribed

(Figures 5, 6, 12, 16)

Original description, van der Wulp (1897).

Based on examination of ten co-types from the British Museum (N.H.) and an understanding of their origin we feel it is necessary to rescue *H. acuticornis* from synonomy under *H. spinicornis*, where it was placed by Steyskal (1965) and earlier alluded to by Neff and Berg (1962, p. 78, 80).

Although van der Wulp (1897, p. 358) gave reference only to "several male specimens," the co-type series we obtained from the British Museum (Natural History) consisted of 6 males and 4 females. All were labelled "Co-type ♂, B.C.A. Dipt. II, *Tetanocera acuticornis* v. d. Wulp." One male and one female were labelled "Mexico City, May 88, HHS," and we assign them to *H. spinicornis* (Loew). The remaining five males and three females were labelled "N Sonora, Mexico, Morrison." Although that locality data is probably inaccurate,

we are obliged to designate a Lectotype male and four male and three female Paralectotypes from these specimens. According to Selander and Vaurie (1962), who cite Horn (1886), Calvert (no precise reference), and Schwarz (no reference), these specimens " . . . were actually collected in Arizona (Graham Mountains, near Fort Grant, and above Fort Huachuca). Schwarz also states that " . . . material from these localities was properly labelled 'Arizona' when sent to American workers . . .," but no specimens of *H. acuticornis* we saw from U. S. sources showed HHS (H. H. Smith) or (H. K.) Morrison as collector. Although no confirmed *Hoplodictya* spp. material from northern Sonora has come to our attention, neither Sonora nor the southeastern Arizona (corrected) locality would place the Morrison material into the Mexican Gulf coastal distribution we now recognize for *H. spinicornis* and *H. australis*, n. sp. Further, we are designating as HOMEOTYPE other specimens at hand which fit our concept of *H. acuticornis*.

The configuration of the posterior surstylus (in particular the nearly angulate, unevenly rounded margin and the bluntly rounded dorsal tip directed dorsally) and the ventral process of the hypandrium (as viewed laterally *in situ*, not turned to expose its maximum width) will distinguish this species from *H. spinicornis*. Ten or more fine bristles on dorsum of protandrial tergite. Female—both spermathaecae almost "fit" (see fig. 12) inside sternum VIII; posterior margin of sternum VII rounded at corners; dorsum of tenth somite without fine bristles. Wing lengths of 28 females, 4.2 to 5.4 mm (average, 4.7 mm); 45 males, 3.5 to 4.8 mm (average, 4.0 mm). Distribution (Figure 15): British Columbia, Washington, Oregon, California, Nevada, Utah, Arizona, New Mexico, Oklahoma, Kansas, Nebraska, Illinois, Texas.

LECTOTYPE, male, wing length 3.8 mm; PARALECTOTYPES, [see preceding comment on probable type locality].

Additional material was seen from the following localities: ARIZONA: [*Cochise Co., Graham Co.*: Lectotype, paralectotypes; ca. 1890 (H. K. Morrison)] (BM); *Coconino Co.*: 7.5 miles s. Flagstaff, 6800 feet, 16 July 1968 (Fisher & Orth) (UCR); [*Yavapai Co.*]: Montezuma Well Natl. Monument, 30 June 1953 (W. W. Wirth) (USNM); *Santa Cruz Co.*: O'Donnell Cienega, 2 October 1970 (B. A. Foote) (KSU). CALIFORNIA[5]: *Alpine Co.*: 2 miles s. Woodfords, 5900

[5]Rather than present a detailed listing of all 22 counties and 53 localities where *H. acuticornis* was collected in California from 1962 to 1970 we have selected 10 sites with inclusive dates to cover repeat visits where the species probably can be taken for an indefinite time. A detailed listing of California localities will appear in a forthcoming Calif. Insect Survey Bulletin.

feet, 11 July-20 September (Fisher & Orth) (UCR); *Del Norte Co.*: Crescent City, 10 feet, 21 June-5 August (Fisher & Orth) (UCR); *Inyo Co.*: 1.7 miles n. Cartago, 3600 feet, 25 April-19 September (Fisher & Orth) (UCR); Buckhorn Springs, Deep Springs Lake, 5000 feet, 9 March-19 September (Fisher & Orth) (UCR); *Mono Co.*: Upper Fish Slough, 10 miles n. Bishop, 4250 feet, 19 April-7 September (Fisher & Orth) (UCR); *Orange Co.*: San Juan Creek, 3 miles e. San Juan Capistrano, 200 feet, 14 January-27 December (Fisher & Orth) (UCR); *Riverside Co.*: Lake Hemet, 4500 feet, 14 April-23 October (Fisher & Orth) (UCR); Santa Ana River, 820 feet, 31 January-12 November (Fisher & Orth) (UCR); Vail Lake, 1400 feet, 31 January-27 July (Fisher & Orth) (UCR); *San Diego Co.*: Scissors Crossing, San Felipe Creek, 2300 feet, 9 January-15 November (Fisher & Orth) (UCR). ILLINOIS: [*Vermillion Co.*]: Muncie, 22 May 1936 (B. D. Burks) (INHS). KANSAS: *Meade Co.*: (no locality) 18 August 1945 (R. H. Beamer) (UK). NEVADA: [*Washoe Co.*]: Steamboat, 3 September 1915 (H. G. Dyar) (USNM). NEW MEXICO: *Otero Co.*: Mescalero, 6200 feet, 22 July 1970 (Fisher & Orth) (UCR). NEBRASKA: [*Chase Co.*]: 10 miles sw. Imperial, 7 Sept. 1961 (Crew) (USNM). OKLAHOMA: *Beckham Co.*: 10 miles e. Erick, U. S. Highway 66 (I-40), 10 August 1969 (C. O. Berg) (CU). OREGON: *Josephine Co.*: 0.5 miles s. Cave Junction, 1300 feet, 21 June 1969 and 6 August 1968 (Fisher & Orth) (UCR). WASHINGTON: [King Co.]: Seattle (no date) (J. M. Aldrich) (USNM); [Yakima Co.]: Toppenish 8 July 1923 (V. Argo) (USNM). TEXAS: Lubbock Co.: Buffalo Springs, 27 April 1969 (J. M. Tenorii) (TTU). UTAH: *Box Elder Co.*: (no locality) 8 September 1964 (K. J. Capelle) (USNM). CANADA: *British Columbia*: Oliver 6 August 1931 (J. Nottingham) (UK); Summerland 8 October 1931 (A. N. Gartrell) (USNM).

Deposition of Material—LECTOTYPE male, and 4 M, 3 F PARALECTOTYPES to BM. HOMEOTYPES.—ANSP, BM, CAS, CU, KSU, MCZ, UCR, UK, USNM.

Habitat.—Localities where we collected *H. acuticornis* were open and relatively unshaded. Emergent or low vegetation (i.e., sedges, grasses) was plentiful, with sparse shrubs 6-8 feet in height at some sites. The water was fairly clean, slowly flowing, and bordered by mud banks or hummocks populated by succineid snails.

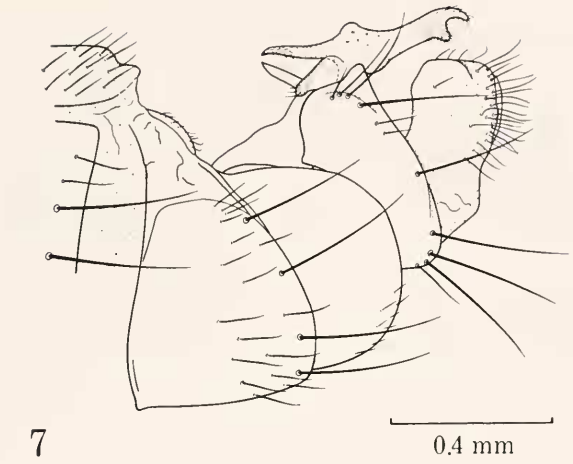
Hoplodictya kincaidi (Johnson)

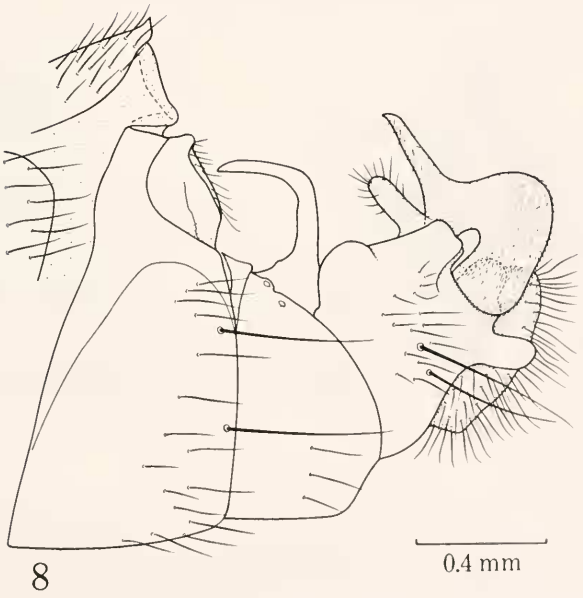
(Figures 7, 13)

Holotype (7004, MCZ) examined (wing length 4.4 mm).

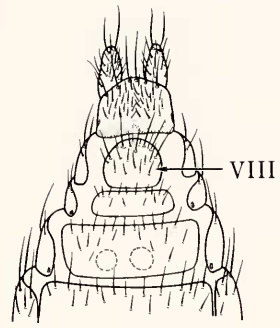
Original description, Johnson (1913).

The posterior surstylus departs strikingly from the other four taxa. It is attenuated and has a bottle-opener appearance. Female—Sternum VII nearly semi-circular. Wing lengths of 4 F, 4.6 mm to 5.2 mm





Figures 7-8. Male postabdomen, dextral view, inverted. Fig. 7 *Hoplodictya kincaidi* (Johnson). Paratype. Bermuda Islands, 23 July 1905 (T. K.) (MCZ). Fig. 8 *Hoplodictya setosa* (Coquillett). U.S.A.; New York, Long Island, Cold Spring Harbor, 5 September 1920 (C. W. Johnson) (MCZ).



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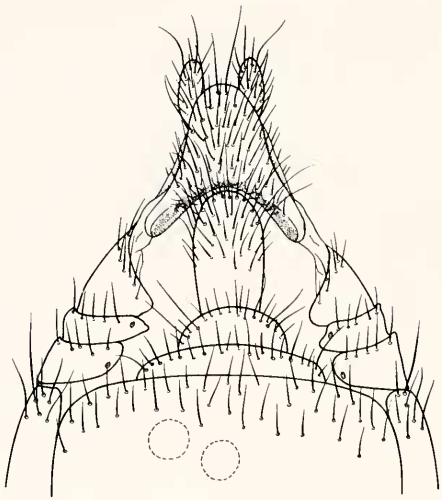

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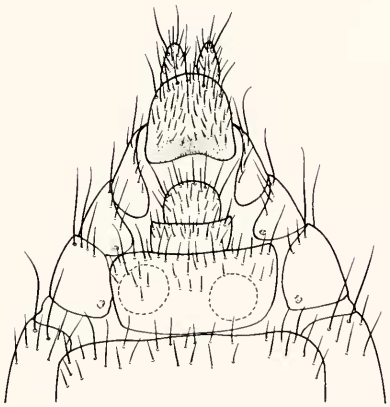
0.4 mm



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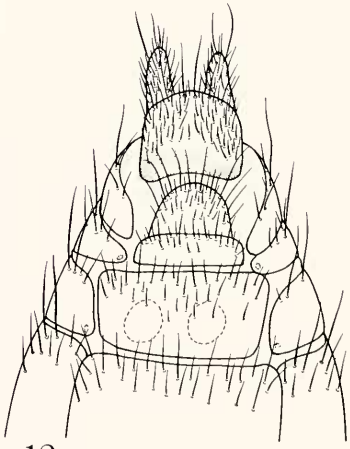

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FIGURES 9-12. Female abdomen, ventral view. Dotted circles = spermathaecae. FIG. 9 *Hoplodictya australis* Fisher and Orth, new species. Paratype. U.S.A., Florida, Paradise Key, 13 March 1919 (E. A. Schwarz) (USNM). FIG. 10 *Hoplodictya setosa* (Coquillett). U.S.A., New York, Long Island, Cold Spring Harbor, 9 August 1920 (J. Bequaert) (MCZ). FIG. 11 *Hoplodictya spinicornis* (Loew). U.S.A.; Texas, Hidalgo Co., Santa Ana Wildlife Refuge, 17 June 1969 (Board and Hafernik) (TAM). FIG. 12 *Hoplodictya acuticornis* (van der Wulp). Homeotype: U.S.A., California, Riverside Co., Riverside, Santa Ana River, 8 March 1963 (R. E. Orth) AS-72 (UCR).

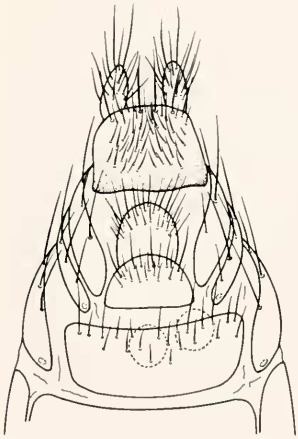
(average, 4.9 mm); 2 M, 4.4 mm and 4.7 mm. Distribution (Figure 15): Bermuda Islands: St. Georges, Nonsuch Island.

Hoplodictya setosa (Coquillett)

(Figures 8, 10)

Original description, Coquillett (1901).

The posterior surstylus has a broad, somewhat hatchet-shaped dorsal process, the accessory lobe is nearly straight and proportionately more massive than those of the other four species. The ventral process of the hypandrium is also massive and assumes nearly a right angle. Female—Sternum VII broadly semicircular; length of Sternum VIII nearly 2× its width. Wing lengths of 8 F, 5.5 mm to 6.7 mm (average, 6.25 mm); 7 M, 5.2 mm to 5.6 mm (average, 5.45 mm). Distribution (Figure 15): Atlantic seaboard of North America from Nova Scotia to northern Florida, Gulf of Mexico coast of northern Florida. Range extensions were provided by C. O. Berg and Karl Valley (CU) —1 M, 1 F, NOVA SCOTIA: *Smith's Cove*, 6 August 1925 (A. Gib-



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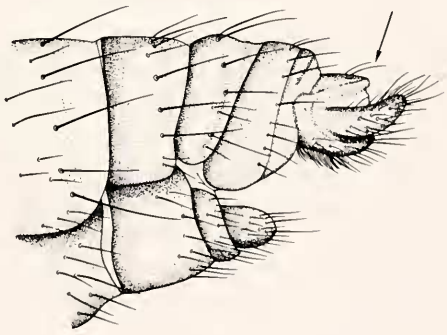

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0.4 mm

FIGURE 13. *Hoplodictya kincaidi* (Johnson). Female. Paratype. Bermuda, 18 June 1910 (C. W. Johnson) (MCZ). FIGURE 14. *Hoplodictya spinicornis* (Loew). Female abdomen, lateral view. Homeotype. U.S.A., Texas, Cameron Co., Harlingen, 9 March 1945 (D. E. Hardy) (USNM). Arrow indicates bristles on dorsum of tenth somite, which seem to be diagnostic for the species.

son). 2 M, 1 F, FLORIDA: *St. Johns Co.*: Crescent Beach, 0.65 miles w. of Matanzas R. on State Hwy. 206, 31 March 1971 (K. R. Valley).

Discussion.—*Superficial separation of the species*: Distribution and relative sizes will be of some help. Occurrence of *H. spinicornis*, *H. australis*, and *H. setosa* in the same microhabitat has not been reported, although adults of all three species have been collected in northeastern Florida and southeastern Georgia. Adults of *H. australis* and *H. spinicornis* have been collected within or near identically named localities. Larvae of *H. setosa* are restricted to the strandline habitat of the mollusk *Littorina littorea* (L.) (Neff and Berg, 1962), but refined sampling techniques will be required to accurately define the specific niches occupied by larvae of *H. spinicornis* and *H. australis*, particularly at localities where these species appear to be rather closely associated.

Its large size alone in most instances should distinguish *H. setosa*. It is the largest and most yellowish of the five species and is found only along the Atlantic seaboard from Nova Scotia to northern Florida and on the gulf coast of Florida at St. Josephs State Park. We have no record of the species from North Carolina or South Carolina.

Hoplodictya australis

H. australis is the smallest of the five taxa and seems to be the dominant species of the genus in Florida. It appears to be sympatric with *H. spinicornis* in Cuba and southeastern United States. Specimens of *H. australis* have been collected along the Gulf of Mexico coast from Florida well into southern Texas and inland into eastern Texas and central Louisiana. Localities where *H. spinicornis* and *H. australis* both occur are TEXAS: New Waverly River, Palmetto State Park, 10 miles n. La Grange, Galveston; LOUISIANA: Basile; MISSISSIPPI: 4 miles w. Bay St. Louis, *Hancock Co.*; FLORIDA: Hialeah, St. Augustine.

Hoplodictya spinicornis

H. spinicornis appears to be the only representative of the genus in Mexico, Guatemala, and Jamaica. In Cuba and in States of the U.S. bordering the Gulf of Mexico it co-exists with *H. australis*. An apparently isolated population of *H. spinicornis* occurs in the vicinity

of Washington, D. C. We have no evidence that it co-mingles with *H. setosa.* A male labelled "Dauphine Id., May 18, 1911 (Ald.)" and "Chordeiles 95179" (USNM) could be from Dauphin Island, Mobile Bay, Alabama. It clearly belongs in *H. spinicornis* and does not resemble any specimen we have seen from near the State of Idaho.

Hoplodictya acuticornis

The material examined indicates that *H. acuticornis* is the sole representative of the genus *Hoplodictya* west of the Rocky Mts., and

FIGURE 15. Distribution of *Hoplodictya* in North and Central America. Only material identified by authors is shown.

does not extend into the Mexican Gulf coastal area where *H. spinicornis* occurs. The material collected east of the Rocky Mts. consisted of a short series from New Mexico, single males from Nebraska, Kansas, and Oklahoma, and single females from Illinois, and Texas. In our opinion none could be considered intergrades between the two species.

The ecological diversity of *H. acuticornis* is indicated by the facts that it has been collected at many elevations from sea level to 7000 feet and at many localities between approximately 31° 30′ (Santa Cruz Co., Arizona) and 49° 35′ (Summerland, B. C.) north latitudes. It has not been taken in natural or manmade waterways of the Sonoran Desert (i.e., in southeastern California, western Arizona, and southern Nevada), nor on the Channel Islands off southern California. A similar appearing sciomyzid fly, *Dictya montana* Steyskal, has been collected in both habitats.

Quantitative data are lacking to substantiate the field observation, but activity of *H. acuticornis* in southern California seems to be rather closely synchronized in a density dependent host-prey relationship to the hygrophilous terrestrial host mollusk, *Succinea californiensis* Fischer and Crosse.

Along the California coastal belt the genus *Succinea* appears in late winter and often by early spring it occurs in large numbers along the muddy banks of streams. From February to April *H. acuticornis* reaches its peak numbers, the *Succinea* sp. population is declining, and by early to midsummer it is becoming very difficult to find. Adult *H. acuticornis* are taken in dwindling numbers as the year progresses, virtually none being taken in November and December. At elevations to 7000 feet, as at Heenan Lake (Alpine Co., California) 38° 38′ latitude, *H. acuticornis* and the genus *Succinea* or other succineid snails can be collected through the summer. Curiously, at Cienega Seca (San Bernardino Co., California) 34° 09′ latitude, elevation 7800 feet, *Succinea* is common yet we have never collected *H. acuticornis* there.

Although not commonly taken by the general collector, *H. acuticornis* cannot be considered a rare species in California where it occurred at 53 sites involving 132 collections (20%) in a total of 671 collections which contained sciomyzids from February 1962 to September 1970. Actual numbers of *H. acuticornis* taken per collection varied from one to 74 and comprised 1% to 65% of sciomyzid flies collected.

Foote (1961) reported *H. spinicornis* from four localities in southern Idaho and from one in Washington (O'Sullivan Dam). We did

not see any of this material, but because of confirmed northern Utah and Washington records, it is presumed to be *H. acuticornis.*

Biology.—The biology of *H. setosa* and *H. spinicornis* and a description of the immature stages were published by Neff and Berg (1962). Newly hatched larvae appear to be highly selective of the species of host mollusk attacked. *H. setosa* selects a prosobranch, *Littorina littorea* (L.), which is found in strandline debris in open salt marshes along the eastern seaboard of the U. S. First instar larvae of *H. spinicornis* apparently prefer species of *Oxyloma* and *Succinea* (Pulmonata: Succineidae). Second and third instars will also feed on a variety of mollusks in the laboratory.

The biology of *H. spinicornis* reported by Neff and Berg (1962) was based on laboratory studies of material from Basile (Louisiana), Refugio (Texas), and Oaxaca (Mexico). We have made positive determinations of *H. spinicornis* and *H. australis* from Basile; we now list only *H. spinicornis* from Oaxaca; Refugio is somewhat south of the known distribution of *H. australis,* but it is possible that both *H. spinicornis* and *H. australis* occur there, too.

Now that the three entities of the *H. spinicornis* complex can be recognized it seems appropriate to repeat their biologies utilizing only pure cultures, perhaps obtained only from California, southern Mexico, and Bahama Islands for *H. acuticornis, H. spinicornis,* and *H. australis,* respectively. *Hoplodictya setosa* may warrant further bio-

Figure 16. Photograph of *Hoplodictya acuticornis* (v. d. Wulp). Dextral appendages removed. Male. Homeotype. U.S.A., California, Mono Co., 2 miles n. Topaz, e. Hwy 395, 5000 feet, 11 July 1966 (T. W. Fisher & R. E. Orth) AS-489 (UCR).

systematic investigation as suggested by its sub-tropical to cold temperate range and the gap (not reported from North or South Carolina) in its known distribution. Biological studies of *H. kinkaidi* have not been published; those of *H. acuticornis* are in progress.

Zoogeographic Considerations.—The occurrence of *H. spinicornis* on Jamaica may be interpreted as further confirmation of ancient land affinity with Central America. The islands of the Caribbean Sea should be intensively worked to elucidate this aspect from the viewpoint that sciomyzid flies are obligatorily associated with terrestrial and fresh water mollusks (*H. setosa* excepted). The senior author visited Puerto Rico for a week in May 1965, but collecting in several types of habitats yielded only one species of sciomyzid fly, *Sepedon caerulea* Melander. Perhaps the genus *Hoplodictya* does not occur on that island.

Acknowledgements.—Illustrations by R. E. Orth. Photo (Fig. 16) by K. L. Middleham. Critique of the manuscript by L. V. Knutson and G. C. Steyskal (USNM) and C. O. Berg (CU) was greatly appreciated.

We gratefully acknowledge the cooperation of the following institutions and individuals in making material available for our study:

ANSP—Academy of Natural Science, Philadelphia, Pennsylvania (S. S. Roback); BM—British Museum (Natural History), London, England (K. G. V. Smith); CAS—California Academy of Sciences, San Francisco, California (P. H. Arnaud, Jr.); CDA[6]—California Department of Agriculture Bureau of Entomology, Sacramento, California (M. S. Wasbauer); CU—Cornell University, Ithaca, New York (C. O. Berg, K. R. Valley); INHS—Illinois Natural History Survey, Urbana, Illinois (D. W. Webb); KSU—Kent State University, Kent, Ohio (B. A. Foote); LAM[6]—Los Angeles County Museum, Los Angeles, California (R. Snelling); MCZ—Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (H. E. Evans); TAM—Texas A&M University, College Station, Texas (H. R. Burke); TTU—Texas Tech University, Lubbock, Tex. (C. W. and L. B. O'Brien); UCB[6]—University of California, Berkeley, California (J. A. Powell); UCD[6]—University of California, Davis, California (R. O. Schuster); UCR—University of California, Riverside, California (S. I. Frommer, T. W. Fisher, R. E. Orth); UK—University of Kansas, Lawrence, Kansas (G. W. Byers); UMTA[6]—University of Minnesota, St. Paul, Minnesota (P. J. Clausen); USNM—United States National Museum, Washington, D. C. (L. V. Knutson, G. C. Steyskal); UW[6]—University of Wisconsin, Madison, Wisconsin (L. J. Bayer).

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2.0163 Synopsis of Hoplodictya Cresson with one new species (Diptera: Scromyzidae).

Abstract.—Males of the five species of this Nearctic genus can be separated by differences in configuration of the surstylus and ventral process of the hypandrium. Females exhibit differences in Sterna VII, VIII; the size of the spermathaecae relative to sterna VIII; and the presence or absence of bristles on the dorsum of the tenth somite. *Hoplodictya australis* Fisher and Orth, n. sp., occurs in Cuba, Bahama Islands, and States of the U.S.A. bordered by the Gulf of Mexico. *Hoplodictya spinicornis* (Loew) occurs in Guatemala, Mexico, Jamaica, Cuba, and States of the U.S.A. bordered by the Gulf of Mexico, with a population near Washington, D. C. *Hoplod'ctya acuticornis* (v. d. Wulp), resurrected, occurs mainly in western U.S.A. and Canada, with populations in New Mexico, Ok-

lahoma, Kansas, Nebraska, and Illinois. *Hoplodictya setosa* (Coquillett) is restricted to the salt marshes of the Atlantic seaboard and the Florida panhandle. *Hoplodictya kincaidi* (Johnson) is restricted to the Bermuda Islands. A Lectotype, male, and seven Paralectotypes are designated for *H. acuticornis.* A Neallotype, male, is designated for *H. spinicornis.* Fifteen figures, one map.—*T. W. Fisher and R. E. Orth, Department of Entomology, University of California, Riverside, CA 92502.*

Descriptors: Diptera; Sciomyzidae; *Hoplodictya acuticornis,* resurrected, Lectotype, paralectotypes; *Hoplodictya australis,* n. sp., southeastern U.S.A.; *H. spinicornis,* redescribed, Neallotype; *Hoplodictya kincaidi*; *Hoplodictya setosa.*

NOTICE TO MEMBERS, SUBSCRIBERS, AND LIBRARIANS

The American Entomological Society's committee on publication has reviewed the financial condition of Entomological News and has found it necessary to cut back to 10 issues a year, the number of issues before 1970. The publication of 12 issues has not resulted in a substantial increase in the number of pages per volume, but it has been expensive. Entomological News is entirely dependent upon subscription fees for its operation; there are no membership fees or invested funds to help in its support. Therefore, rising costs and the additional issues have created a considerable deficit. The change back to 10 issues a year will be effective immediately. There will be no issues for August and September.

Independent of, but concurrent with the above change, the editor, Ross H. Arnett, Jr. announces his resignation. A new editor is being sought. Until further announcement, all manuscripts should be sent to: American Entomological Society, 1900 Race Street, Philadelphia, PA 19103.